To U.S. Environmental Protection Agency (EPA)

Subject: San Jacinto River Waste Pits Superfund Site – Final Comments on Draft Feasibility Study

Dear Gary,

Thank you for asking the Technical Review Team of Harris County ("Technical Review Team") to review and provide comments on the Draft Feasibility Study ("Draft FS") prepared by responsible parties McGinnes Industrial Maintenance Corporation and International Paper Company and their consultant Anchor QEA in connection with the San Jacinto River Waste Pits Superfund Site ("SJRWP" or "Site").

The Technical Review Team's review of the site information and the responsible parties' preferred proposed remedy in the Draft FS indicates on its face that it does not comply with the requirements of Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"). For the reasons set forth in more detail in these comments, The Technical Review Team believes that the draft Feasibility Study is defective and that an additional draft Supplemental Feasibility Study or other supplemental studies and testing will need to be undertaken by the responsible parties to address the deficiencies that render the Draft FS document non-compliant under CERCLA and make the proposed remedy inappropriate for the Site.

TECHNICAL REVIEW TEAM FINAL COMMENTS

The Technical Review Team's final comments are presented in the following sections as: General Comments and Section Specific Comments.

General Comments:

1) The Technical Review Team has reviewed the attached November 1, 2013 U.S. Army Corps of Engineers' ("USACE") Report identifying design and construction problems and concerns of the temporary, interim armored cap put into place during the Time Critical Removal Action ("TCRA"). In the Draft FS, the armored cap is being proposed as an essential part of the remedy being promoted by the responsible parties. However, the USACE's documentation of multiple design, instability and construction concerns of even an interim cap in an aquatic environment subject to waves, tides, flooding and storm events that frequent this area shows that the recommended remedy is not suitable for the Site. Thus we concur with the USACE evaluation and also have similar concerns with the overall design and construction of the temporary cap.

2) The Technical Review Team believes that a permanent solution to significantly reduce the risk to human health and the environment is not presented and that the recommendation to leave the dioxin contamination in place does not meet the governing threshold criteria of the CERCLA. CERCLA requires and prefers remedies that permanently and significantly reduce the volume, toxicity or mobility of the hazardous substances, so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment. Leaving such toxic

material in place in a marsh and aquatic environment is not a permanent or appropriate solution given the frequency and severity of tropical storms, floods, tidal action and hurricanes that affect the area, as well as subsidence activity. There is also an issue regarding the requirement for treatment of principal threat wastes. The Technical Review Team believes the dioxin contamination should be removed from the River ecosystem, thus eliminating the continued possibility of redistributing the contamination into the Houston Ship Channel (HSC), San Jacinto River and Galveston Bay system.

3) The alternatives presented are limited and do not represent a thorough review of potential permanent and acceptable solutions.

4) In addition, The Technical Review Team does not believe that all of the Applicable or Relevant and Appropriate Requirements ("ARARs") have been established and remedial alternatives evaluated to meet them. Specifically, the Texas Surface Water Quality Standards (TSWQS) including the dioxin fish tissue standard of 0.4 ng/kg TCDD Equivalents is not mentioned and the current proposed PCLs will not achieve this State standard. Therefore, the fishing advisory will never be lifted and the State Standard will not be attained. Similarly, there is no discussion of floodplain management and impact considerations of construction in the floodplain and floodwater pathways and how that would impact flood control, river pathway and water flow issues and obstructions in navigable waters, as one example. As an initial matter, constructing an armored cap in a floodplain would have the predictable effect of detrimentally impacting floodplain management and other critical flood control measures. Such activities are not allowed except by permit and constructing structures that could have these impacts on a key river would be disfavored for numerous reasons. These and many other ARARS do not appear to be considered at all.

5) A Protective Concentration Limit ("PCL") based on a recreational user scenario is not acceptable. A lower PCL is required to meet the State tissue level and to support subsistence fishing which must be attained on all state water bodies.

6) Furthermore, The Technical Review Team disagrees with the assumption that fish tissue levels are decreasing in the area, as evidenced by 2012 University of Houston (UH) data. These levels have been very consistent since 1990, as evidenced by the attached data. This presents another fundamental flaw in the Feasibility Study.

See Attachment 2 UH Sediment and Fish Data

7) It is our understanding that this Draft FS only addresses the North of I-10 Investigation Area and that a subsequent FS will address the South of I-10 Investigation Area. Therefore, the title of this Draft FS should be modified to clarify that it only applies to the North of I-10 Area.

8) ~~Due to the many deficiencies and inconsistencies in the Draft FS, the lack of sufficient detail and the minimum number of appropriate alternatives presented, we feel this document does not meet the requirements of CERCLA.~~

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Section Specific Comments:

1) Executive Summary

a) The Technical Review Team believes the document is inadequate in that it does not present sufficient alternative remediation strategies which cover options or combination of options for removal and stabilization of contaminated material.

b) ~~The Technical Review Team disagrees with the evaluations on alternatives, long term and short term environmental impacts, re-suspension of waste, impacts of sediment in the river and the general characterization of the risk as low (short term and long term).~~

c) The Technical Review Team disagrees with the assertion that greenhouse gases, particulate matter and ozone emissions associated with dredging alternatives would be a significant impact. The volume proposed for dredging is negligible compared to the 3 to 5 million CY of dredging occurring annually for maintenance of the HSC/Galveston Entrance.

d) The Technical Review Team disagrees with the responsible parties' recommendation that Alternative 3 is the best option for this site, for many reasons noted below.

2) Section 2.2.1, Recreational and Navigational Use. It should be pointed out that there is no restriction or limitations to the general public in accessing the area within the USEPA Preliminary Site Perimeter. Any user is free to access this area as often as they like and there is no current practical way to restrict subsistence fishing. In addition, all of this area must meet all applicable state water quality standards, including the dioxin/furan/PCB TEQ value of 0.4 ng/kg fish tissue standard.

3) Section 2.4.2, Riverbed Characteristics and Sediment Transport, Page 9, the third paragraph states that "Near-bed velocities generated by episodes of propeller wash are expected to be significantly higher than those due to tidal and riverine currents"…Whereas, Section 2.2.1 states access to the TCRA Site via boat is currently constrained to the North, West, South and Southeast. This seems to be a contradiction and possibly factors affecting the modeling assumptions.

4) Section 2.5.3.1.1, Effect of Time Critical Removal Action, Sediment, Page 14, states "In addition, on-going natural recovery continues to reduce surface sediment concentrations outside of the TCRA Site, as indicated by the long-term chemical fate model simulations". As evidenced by Attachment 2, the site data does not show a decreasing trend and this statement is incorrect.

5) Section 2.5.3.1.1, page 14, states that the sediment TEQ SWAC was reduced by more than 80% by implementing the TCRA. However, concentrations measured in August 2011 as part of the TMDL project indicate that the TEQ levels at station 11193 (San Jacinto River at I-10) have not decreased (see Table 1, Attachment 2). Furthermore, TEQ sediment concentrations in the vicinity of the pits (as depicted in Figure 3-1 of the Draft FS) remain at levels comparable to those measured in the summer of 2005 as part of the TMDL study (see Table 1, Attachment 2).

6) Section 2.5.3.1.2, page 14, states in the first paragraph that 2378-TCDD and 2378-TCDF were not present in surface water over the armor cap. Because of the limitations of SPME fiber sampling, we do not believe that this statement can be supported. In addition, the SPME sample at best accounts only for the freely dissolved fraction of dioxins in water and, due to the hydrophobic nature of dioxins, a substantial part of the TEQ water column concentration will be in the suspended phase, which was not measured as part of the RI.

7) Section 2.5.5.1, Bioaccumulation, Page 17. States "bioaccumulation of PCDD/Fs cannot be understood on the basis of aggregate quantities, such as TEQ concentrations." "the majority of dioxin and furan congeners do not consistently bioaccumulate in fish or vertebrate tissue.… As a result, systematic predictions of bioaccumulation from concentrations of dioxins and furans in abiotic media (both sediment and water) are only possible for tetrachlorinated congeners. However, even these correlations are weak, and are associated with high uncertainty."

We concur that bioaccumulation varies by congener, for reasons that are thoroughly described in the technical memo, and that bioaccumulation of the more chlorinated PCDD/Fs is limited. This has been previously reported by the UH/Parsons team in their numerous reports to the TCEQ TMDL program as well as their scientific publications (Dean et al. (2009); Dean et al. (2003); Suarez et al. (2005)). However, it is important to keep in mind that the PCDD/F risk from fish consumption is primarily due to 2378-TCDD and 2378-TCDF. While some of the larger congeners are relatively abundant by mass in fish and shellfish tissue, 2378-TCDD and 2378-TCDF are on average responsible for more than 80% of the risk-normalized concentration (expressed as TEQ) in fish and crabs, as shown in the table below. In fact, more than 80% of the TEQ in fish and 60% of the TEQ in crabs was from 2378-TCDD alone. Thus, the aggregate quantity, TEQ, primarily reflects 2378-TCDD. As the references cited in the bioaccumulation technical memorandum show, 2378-TCDD and 2378-TCDF are substantially bioaccumulated in crabs, and 2378-TCDD is bioaccumulated in catfish, in a manner and degree not unlike most other hydrophobic organic compounds. Moreover, their concentrations in fish and shellfish are roughly proportional to concentrations in sediment, implying that application of a Biota Sediment Accumulation Factor (BSAF) is appropriate to predict bioaccumulation from concentrations in sediment. This is illustrated in Figures 3 and 10 of the bioaccumulation memo, reproduced below. We do not consider these correlations to be particularly weak for a natural system, particularly after considering that fish and crabs are mobile organisms and likely to be exposed to a range of contaminant concentrations, even considering high site fidelity. Also, the variability in these BSAFs can be reduced by utilizing the typical form of the BSAF, the ratio of lipid normalized tissue concentrations to organic carbon – normalized sediment concentrations, and computing BSAFs by the method of Burkhard (2009). Moreover, we believe that the uncertainty in BSAF should not preclude its use in developing appropriate PCLs. We believe that bioaccumulation of PCDD/Fs can be understood based on TEQ due to its dominance by 2378-TCDD, though we concur that it is best to consider the bioaccumulation potential of each congener individually.

Contribution of Individual Congeners to TEQ* based on Data in the Remedial Investigation Report

Media	Fish Collection Area	2378-TCDD	12378-PeCDD	1234678-HpCDD	OCDD	2378-TCDF	12378-PECDF	23478-PeCDF	123678-HxCDF	OCDF
Sediment	1	67.3%	0.94%	1.56%	1.41%	26.9%	0.14%	1.28%	0.37%	0.07%
Sediment	2	71.7%	0.74%	0.12%	0.12%	25.7%	0.16%	1.19%	2.00%	0.01%
Sediment	3	64.1%	1.21%	5.36%	5.67%	22.4%	0.11%	0.70%	0.38%	0.13%
Crab	1	77.3%	0%	0.20%	0.03%	20.5%	0.13%	1.22%	0.65%	0%
Crab	2	67.3%	0%	0.19%	0.05%	26.9%	0.41%	4.12%	0.97%	0%
Crab	3	62.9%	0%	0.29%	0.03%	24.6%	0.96%	9.16%	2.04%	0%
Catfish	1	95.6%	2.17%	0%	0%	1.10%	0%	1.15%	0%	0%
Catfish	2	94.2%	2.56%	0%	0%	2.04%	0%	1.23%	0%	0%
Catfish	3	92.5%	4.05%	0%	0%	1.80%	0%	1.48%	0%	0%

*non-detected congeners disregarded in calculation of TEQ. TEFs were from Texas surface water quality standards 30TAC§307

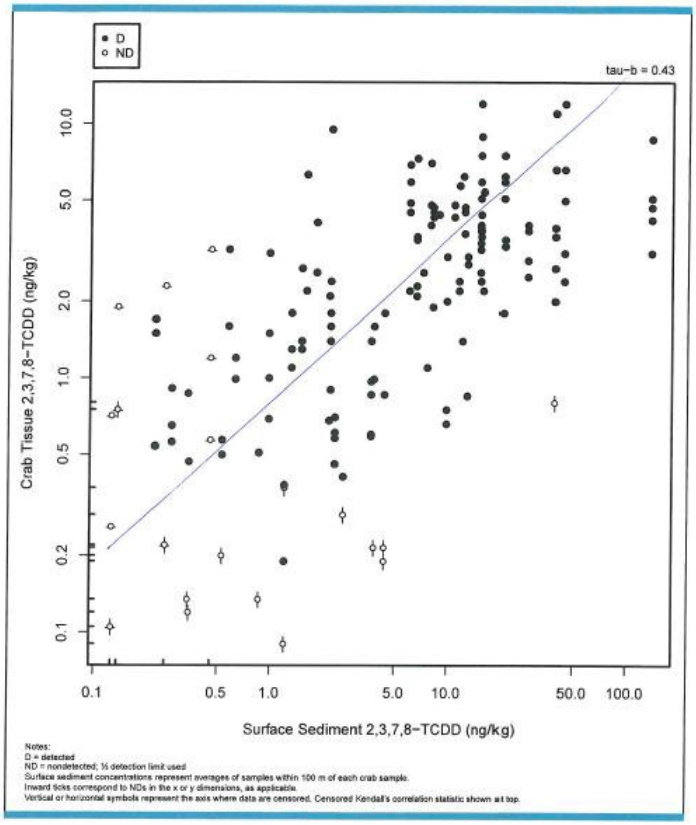

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Figure 3
Relationships between Blue Crab Tissue and Surface Sediment Concentrations of 2,3,7,8−TCDD (ng/kg, ND=½DL)
Bioaccumulation Technical Memo
SJRWP Superfund/MIMC and IPC

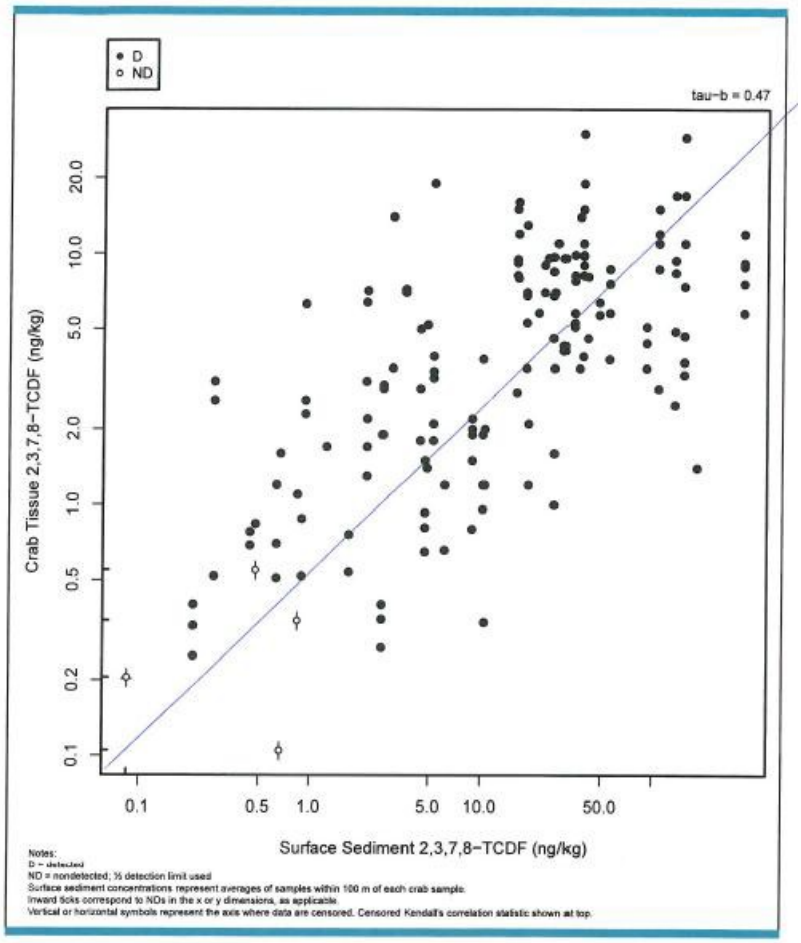
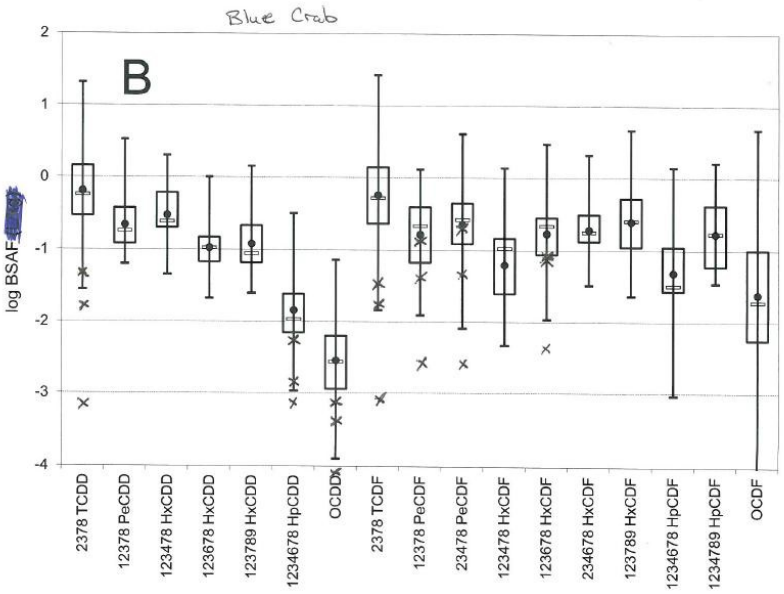


Figure 10
Relationships between Blue Crab Tissue and Surface Sediment Concentrations of 2,3,7,8−TCDF (ng/kg, ND=½DL)
Bioaccumulation Technical Memo
SJRWP Superfund/MIMC and IPC

The BSAFs reported for blue crab in the RI are anomalously low relative to those reported by the UH/Parsons Team. In the figure below, the BSAFs reported for the three fish collection areas by congener are displayed with an "x" superimposed on box plots developed from data reported by UH/Parsons, which involved co-located sediment and crab samples from dozens of sampling stations throughout the Houston Ship Channel (HSC) and Galveston Bay system over several years. In many cases, the BSAFs reported are lower than any of the more than 100 values measured by UH/Parsons. This might be expected to result from a combination of high localized sediment PCDD/F concentrations in the Preliminary Site Perimeter (which constitute the denominator of the BSAF) with mobile organisms (crabs) that are exposed over their travels to less contaminated sites (and thus a lower BSAF numerator). However, the sediment PCDD/F concentrations utilized in the RI BSAF calculation are approximately equal to the average sediment concentration from the entire system reported by UH/Parsons, and the source of the low BSAF was instead found to be anomalously low levels reported in crabs from the site. The reported levels in crab are anomalously low even when compared to samples collected within the Preliminary Site Perimeter reported by UH/Parsons. We recommend that the source of this discrepancy be further investigated, as it represents one of the major PCDD/F exposure routes to humans. It may be due to differences in the

size/age of the crabs collected, or judgments on what portion of the edible meat was extracted from the carapace for analysis. This discrepancy was not observed for catfish tissue.



8) Section 3.1 – Recommended Protective Concentration Levels (PCLs).

a) The 95% fish tissue TEQ concentration used in the Baseline HHRA are lower than all but one of the samples reported by UH/Parsons for fish collected within the Preliminary Site Perimeter from 2002 to 2010. Given the fact that concentrations at the site have been observed to be much higher, it seems unlikely that the numbers used in the BHHRA represent the true maximum reasonable expected concentration in the evaluation of risk from fish consumption.

b) The TEQ PCL for sediment outside the footprint of the TCRA cap was set at 220 ng/kg.

- This concentration is too high since it does not meet the maximum cancer risk level of 10-5 set by TCEQ in the TSWQS and the associated fish tissue standard. The PCL was recalculated using equation 5-6 of the RI along with the common parameters and pathway specific parameters for a hypothetical subsistence fisher provided in Table H5 of the RI, and a cancer slope factor (CSF) of 105 kg-day/mg. The recalculated sediment PCL is 16 ng/kg, which is lower than the proposed PCL by a factor of 14. This approach is preferable over the use of a tolerable daily intake (TDI) because USEPA uses a linear dose response model to evaluate the toxicity of 2,3,7,8-TCDD. In addition, this is the approach used to set the TSWQS (TAC §307.6). Finally, because the CSF is based on 2,3,7,8-TCDD and the other congeners present differing behaviors, the PCL should be set for 2,3,7,8-TCDD and not TEQ as a whole. To account for the carcinogen effects of the remaining congeners, the PCL for 2,3,7,8-TCDD should be a fraction of the 16 ng/kg.

- Sediment target PCL concentrations can be calculated using the tissue-based TSWQS of 0.4 ng-TEQ/kg (TAC §307.6) and average site-specific BSAFs. Sampling data collected between 2002 and 2005 as part of the TMDL Study estimated that TCDD contributes 80% of the total TEQ in tissue samples. Thus, the portion of TEQ attributable to TCDD was assumed equal to 0.32 ng/kg. Using the average BSAF of 0.34 measured in the remedial investigation, the resulting sediment target TCDD concentration would be 0.94 ng/kg.
- The cancer hazard based PCLs for TEQ in fish tissue proposed for this Superfund Site are between 1.5 and 12 ng/kg. These PCLs exceed the tissue-based TSWQS of 0.4 ng/kg, which is required to be met in all waters in Texas.

9) Section 3.3, Applicable or Relevant and Appropriate Requirements ("ARARs").

TSWQS (30 TAC §307.1-10) are one of the ARARs listed in Section 3.3. To protect human health from dioxins in fish consumption, Texas has adopted a water quality criterion of 0.4 ng/kg of 2378-TCDD TEQ in fish tissue in waters of the state. Based on the average site-specific BSAF of 0.34 measured in the remedial investigation, catfish exposed to the site sediments at 220 ng/kg TEQ (~149 ng/kg 2378-TCDD based on site area weighted concentrations) are expected to result in catfish tissue concentrations of approximately 51 ng/kg 2378-TCDD, without even considering contributions to TEQ from other congeners. This predicted concentration is more than 100 times higher than surface water quality standards which must be met. While there is uncertainty in the measured BSAFs, even the lowest measured BSAFs predict substantial exceedance of water quality standards for fish tissue. We recommend that the proposed PCLs be revised to consider this water quality standard in the ARARs. Additional ARARs must also be considered, as noted in prior sections of this document.

See Attachment 3 for TCEQ TSWQS TEQ criteria.

10) Sections 4 through 6; Section 4, Development of Remedial Alternatives; Section 5, Detailed Analysis of Remedial Alternatives and Section 6, Comparative Analysis of Remedial Alternatives

a) The only permanent solution is removal of dioxin impacted sediment and soil. As noted in more detail in prior sections of this document, this is due to the occurrence of hurricanes, tropical storms and/or flooding on the San Jacinto River which would displace the capped soil and soils outside of the capped area.

b) The alternative descriptions in Section 4 and the cost estimates in Appendix C need more details.

The Draft FS document overall is very limited and abbreviated in the descriptions, analysis and alternatives presented. From the information provided, it is very difficult to properly evaluate the alternatives and potential remedies. All sections should be substantially expanded. For example, there needs to be a description of the physical properties of the soil/sediment that would be removed. More details need to be provided on the construction methods and the rationale for selection of the construction methods used. An explanation of the classification and corresponding disposal requirements for soil/sediment taken offsite for disposal needs to be provided. Backup calculations for unit costs and quantity calculations need to be provided. More explanation of the basis for evaluation of each alternative for each CERCLA criteria needs to be provided. An

explanation of how the soil/sediment properties, site conditions and construction methods impact the alternative evaluation needs to be provided. The alternative evaluations in Section 5 should have sub-headings for each of the CERCLA criteria, except state and community acceptance which can only be addressed after a public comment period.

c) Of the six alternatives proposed, only two list any removal of sediment/soil as an option. Alternative 5 includes removal of 53,300 cy of sediment/soil with dioxin TEQ above 13,000 ng/kg. Alternative 6 includes removal of 208,300 (if text is correct) of sediment/soil with dioxin TEQ above 220 ng/kg. Both alternatives assume off-site disposal and costs are presented for landfill disposal and incineration. We feel there should be several alternatives which include a range of removal volumes.

d) The Draft FS should explain why costs are given for both landfill disposal and off-site incineration. Explain the conditions when incineration would be required.

e) For alternatives 1, 2 and 3, the Draft FS does not describe the potential for erosion and release due to a major storm.

f) The Draft FS does not include a section for technology screening or alternative screening. The text in Section 4 states that technology and alternative screening was done in the Remedial Alternatives Memorandum (RAM) dated Dec 2012. The Draft FS should include technology and alternative screening information to present a thorough and complete document.

g) Flooding on the San Jacinto River near the site is a serious issue. The Draft FS does not take into account that any construction in the flood way of the River must be studied for its impact on flooding and that offsets for this displacement need to be included in every alternative presented in the Draft FS that provides for any permanent structure in the flood way. This includes the issue of leaving the cap in place as it is or making any additions to its height or overall footprint.

11) Section 4.3 states that the cap in Alternative 3 would be designed to meet "No Displacement" design criteria. The "Minor Displacement" criterion was used for design of the existing TCRA cap. In addition, in Alternative 3, the slopes would be flattened from 2 horizontal to 1 vertical to 3 horizontal to 1 vertical and the armor stone would be designed for a higher factor of safety of 1.5.

12) The first sentence of Section 5.1.1 states: "The No Further Action remedial alternative would be protective of human health and the environment." The basis of this statement is the assertion that sediment with concentrations above the proposed PCL was capped during the TCRA, or is already buried by cleaner sediment. The existing cap and armor stone has been proven to be inadequate and therefore the no action alternative would not be protective of human health and the environment. In addition, the statement is not accurate and the appropriate PCL has not been determined to be protective of human health and the environment. Nor does the proposed PCL meet all appropriate ARARs (see above).

13) Section 5.1.1 states that modeling indicates that net erosion depths would be limited to less than 15 centimeters. The modeling needs to consider total erosion during severe weather events that could erode deeper and expose sediment with significantly higher concentrations.

14) Sections 5.2.1 and 5.3.1 also state that the Monitored Natural Recovery (MNR) and Capping alternatives would be protective, using the same rational as used for the NFA alternative. Again, this statement is inaccurate.

15) Section 5.4.2 states that a sheetpile does little to enhance short-term effectiveness "because of documented effectiveness issues." Although removal of the material should be accomplished, sheet pile can be designed and installed to make an effective barrier and over-come the issues listed in the Draft FS. For example, there would not be gaps in a properly designed and installed sheet pile barrier. A sheet pile barrier could be installed outside the area of elevated contamination, which would avoid the potential for re-suspension of contaminated sediment during pile installation and removal.

16) Section 5.5.2 states the long-term effectiveness of partial dredging would be reduced by dredge residuals. As stated in other locations within these comments, we feel that better engineering controls and methods can be used to substantially reduce any long term effects from dredging. In addition, if any levels are above the appropriate PCLs, then those sediments will also be removed during the dredging process, leaving lower level residuals than the ones provide in this Draft FS document. Furthermore, if needed, residual post-dredge contamination can be eliminated by placing cover material over these areas.

17) Section 5.5.2 states that dredging may degrade the reliability of the existing containment due to scour; however, there is no explanation given. Why would this happen? With proper design, this should not be an issue.

18) Section 5.5.2 states that modeling shows long-term elevated levels in surface water and sediment concentrations due to dredging. It appears that the responsible parties have overestimated the amount of sediments that they claim would be suspended. In addition, while there may be short-term elevated levels from dredging, it would be unusual to have long-term elevated levels from dredging. The modeling assumptions should be critically reviewed and appropriate engineering controls developed. Contamination in many areas across the country is being effectively dredged and removed to substantially reduce the risk to human health and the environment.

    See Attachments 4 and 5 for other Dioxin Superfund Remedial Action efforts taking place across the country. In addition, these show PCL levels at much lower levels required to protect human health and the environment. These are much more in line with the levels we derived above.

19) Section 5.6.2 states that modeling results shows that the long-term sediment surface concentrations would be three times higher after dredging, compared to natural recovery. As stated above, this is a very unusual prediction, especially considering that sediment and tissue levels have not changed since 1990 and may be trending upward. Thus it is unclear how this statement can be made. We recommend a critical review of the assumptions used in modeling and the results. In addition, if dredged surfaces exceed the PCL, then they must be removed, thus decreasing the surface value predicted in modeling. Therefore, alternatives involving dredging should be reevaluated and additional scenarios considered once the modeling issues are resolved.

a) The modeling results in the Draft FS are based on an assumed release of 3% of the dredged material mass. As noted in other comments, the mass of re-suspended sediment can be eliminated by rigid containment barriers around the dredge or excavation areas. Given the shallow water depths across most of the site, it is feasible to install rigid barriers in the majority of the removal area shown for Alternative 6. The only area where complete containment is not feasible is the northwest portion where the water is deeper.

b) Footnote 4 states an assumed dissolved phase release was used in the model. Since dioxins have very low solubility, the dissolved portion would only represent a fraction of release during dredging. Since the release would largely consist of sediment-associated dioxins, likely re-deposit nearby, the actual impact to water quality will be less than predicted by the model results presented in the Draft FS.

20) In general, the Draft FS describes the potential for releases during dredging or in-situ solidification, but ignores the potential for continued release of sediment contaminants under the existing TCRA cap or the cap recommended in Alt 3. As recently documented by the USACE, even the interim cap could not withstand the conditions in the river during a short period of time (10 yr. storm). Design, stability and construction concerns were also documented in the USACE review.

21) The Draft FS should consider alternatives that use dredging with "on-site" containment in an upland confined disposal area which could be located in close proximity. In a similar situation in Harris County where DDT contaminated the submerged sediments of Greens Bayou, a bank-to-bank dredge was conducted to remove the source contamination and the responsible parties designed and constructed a lined upland cell to accept the material. This was a successful permanent removal of highly toxic materials from an aquatic environment into an upland disposal area where exposure pathways were permanently eliminated.

22) Given the shallow water depths, it is feasible to construct a temporary earth/rock berm around the majority of the dredge area. The berm could be placed where the existing ground surface elevation is elevation minus 1 to 2 feet (NAVD88 datum), or higher. A berm would provide complete containment of re-suspended sediment, which would eliminate impacts to water quality and sediment quality. The figures in Attachment 6 show the locations of cores with TEQ concentrations greater than 13,000 ng/kg. All four of the core locations with TEQ greater than 13,000 would be inside the potential containment berm.

Attachment 6 shows the figure referenced.

23) The excavation could be sequenced to work from the center of the area that is above mean tide level towards the perimeter. The unexcavated area around the excavation would serve as a berm to contain re-suspended sediment. This could be done with, or without, the temporary berm described in the comment above.

24) The alternative descriptions in Section 4 need more details on items such as (a) the physical properties of the soil/sediment (especially grain size, percent solids, organic content and density), (b) the proposed construction methods and how the soil/sediment types and site conditions impact construction methods, (c) the basis for classification of excavated or dredged material for off-site

disposal, (d) temporary facilities needed, (e) barge and truck haul routes, etc.

25) The cost estimates in Appendix C need to show much more detail on how the unit costs were calculated and how the quantities were calculated.

26) The quantities in Table 4-1 and the cost estimate in Appendix C do not match and need to be corrected. Specific examples are listed below:

a) For Alternative 4, Table 4-1 lists 1,400 lf of sheet pile, but Appendix C cost table lists 800 lf.
b) For Alternative 4, Table 4-1 lists 3,400 cy of armor rock and 6,900 cy of TCRA armor rock replacement, but Appendix C cost table lists 6,100 tons of additional armor rock, 9,000 tons of armor rock A and 5,000 tons of armor rock C/D.
c) Text in Section 4.4 says existing TCRA cap armor rock would be washed and re-used if possible. This would also apply to Alternatives 5 and 6, but that is not stated in the text. Cost estimates in Appendix C for Alternatives, 4, 5 and 6 include cost of $682,000 for off-site disposal of TCRA riprap (i.e. armor rock). After washing, armor rock should be suitable for re-use on site.
d) Text in Section 4.5 and Table 4-1 says that Alternative 5 includes 53,300 cy of dredging. Cost estimate in Appendix C lists 7,000 cy of water-based excavation/dredging and 46,300 cy of land-based excavation, for a total of 53,300 cy of removal. Need to provide more explanation of method of construction and volumes in text and explain what removal will be done with land- based equipment and what will be done with water-based equipment.
e) Text in Section 4.6 and Table 4-1 says that Alternative 6 includes 208,000 cy of dredging. Cost estimate in Appendix C lists 208,300 cy of water-based dredging and 46,300 cy of land-based excavation. Need consistent volumes.

27) Cost estimate in Appendix C for Alternative 6 includes $10,340,000 for Mobilization and Demobilization. This is unusually high for this type of work. Please explain the components of this number.

28) Cost estimate in Appendix C shows 421,500 tons for off-site disposal in Alternative 6. If the correct removal volume is 254,600 cy (208,300 + 46,300), this is 1.65 tons per cy. For Alternative 5, the weight is 74,600 tons for 53,300 cy, or 1.4 tons per cy. The conversion from volume to disposal weight is inconsistent.

29) The cost estimate in Appendix C for Alternatives 5 and 6 only include silt curtains for containment of sediment re-suspended during dredging. No costs for sheet pile is included. Use of rigid barriers, such as sheet piles or temporary berms, would be much more effective in containing re-suspending sediment and protecting water quality and sediment quality outside the area of sediment removal.

Appendix A Comments

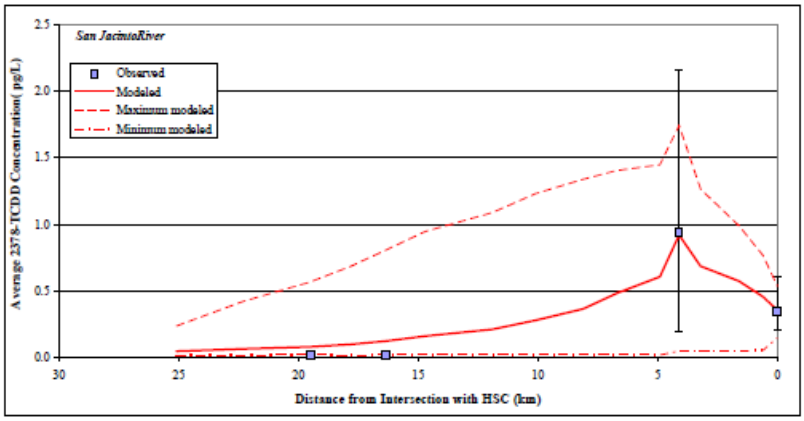
30) Section 1.1.3 of Appendix A, page 6, first paragraph indicated that “the chemical fate model predicted a decline in surface sediment concentrations within the area surrounding the USEPA’s Preliminary Site Perimeter over the period from 2005- to 2010 that is within a factor of 2.5 of the decline estimated from data-based evaluations […]” Samples collected between 2002 and 2011 in

the San Jacinto River for water column, fish tissue, and sediment do not support the conclusion that there have been declines of dioxin concentrations (see Figure 6, Attachment 2).

31) Section 3.2.1.1 of Appendix A, Page 19: The assumption of a dioxin/furan concentration of zero within the TCRA site footprint under future conditions seems unrealistic. It is our impression that this assumption is based on the SPME fiber sampling of pore water within and overlying the armoring substrate. We do not believe this limited type of data supports the assumption.

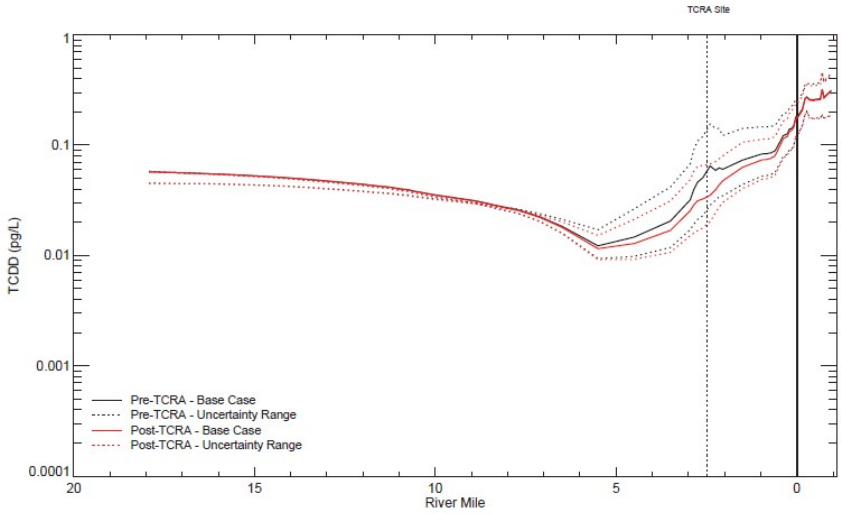
32) Section 3.2.2.1 of Appendix A, In Figure 3-14, the chemical fate and transport model for base case conditions shows water column concentrations of TCDD declining from approximately 0.06 pg/L at the upstream boundary below Lake Houston down to nearly 0.01 pg/L at river mile 5 upstream of the TCRA site, before rising to approximately 0.07 pg/L at the TCRA site, then rising further to approximately 0.2 pg/L at the lower boundary near the confluence with Buffalo Bayou. Neither these levels nor the pattern are supported by data collected by the TCEQ TMDL effort, even considering the model uncertainty bounds. The TCEQ TMDL data, measured between 2002 and 2012 using high- volume sampling for low detection levels, showed TCDD concentrations of no more than 0.1 pg/L upstream of the TCRA site, rising sharply to approximately 1 pg/L at the I-10 bridge near the TCRA (0.23 – 2.16 pg/L, average = 1.07 pg/L, n=6), then falling to an average 0.4 pg/L at the confluence with Buffalo Bayou. For comparison purposes, the model outputs of the TMDL model (a) and Feasibility Study model (b) are reproduced below. Because model predictions do not appear to overlap with observations, even after considering model uncertainty, we are concerned that the model does not accurately simulate sources of TCDD and processes controlling TCDD concentrations. It does appear to be a reliable management tool for evaluating remedial alternatives. Additionally, because the simulated concentrations underestimate water concentrations, we believe the remediation scenarios show a much greater impact on dioxin levels in the water column than could be expected. If the initial levels are high (as supported by the sampling data), then the remediation will not affect the overall concentrations significantly.

(a) TCEQ TMDL model of TCDD in the San Jacinto River, with observed concentrations



Error bars denote the range of measured concentrations

(b) Feasibility Study Model of TCDD in the San Jacinto River



33) Section 3.2.2.2 of Appendix A, page 26, states in the first paragraph that the decline of TCDD in surface sediments within the USEPA's Preliminary Site Perimeter corresponds to a half-life of 11 years. This rate is not supported by analysis of sediment or water concentrations measured in the San Jacinto River at I-10 between 1993 and 2011. Sediment samples exhibited an increasing trend as shown in Figure 7 of Attachment 2.

Trends in biota, sediment, and water dioxin concentrations, as well as sediment cores, do not appear to exhibit any natural recovery over the past twenty years. If natural depuration processes were occurring to the extent indicated by the model-predicted dioxin half-lives, and the levels in water and adjacent sediment have not been declining, are we correct in assuming that the only way to support the observed levels and temporal and spatial trends was by substantial fluxes of dioxins from the waste pits to counteract this natural depuration? Thus, the simulated levels of natural recovery are unsupported.

34) Appendix A, Figures 3-15 to 3-18: The model predicts some very rapid natural recovery rates of TCDD concentrations in sediments and water with no further action. Please describe the key processes in the model that are primarily responsible for these reductions and present the supporting proof.

35) Section 4.2.1.2 of Appendix A, page 30, states in the last paragraph that "Potential releases of chemical mass during remediation activities were simulated in the fate model as dissolved phase flux of dioxins/furans to the water column within each remediated grid cell." Given the hydrophobic nature of dioxins, most of the release will be associated with suspended sediments, less bioavailable and more likely to re-deposit nearby.

36) Section 4.2.1.2 of Appendix A, page 32, states in the first paragraph that it was assumed in the model that releases during sediment removal for the dredging activities will occur for 13 months. This length seems long for completing dredging activities and that resulting concentrations would be this elevated with good engineering practices. Additionally, dredging will impact small areas at the time, not the entire area for the duration of the dredging activities.

37) Section 4.2.1.3 of Appendix A, Table 4-2, includes TCDD and TCDF bed concentrations for the model for dredging alternative. These concentrations are too high since dredging should be conducted along with collection of confirming sediment samples to ensure a level less or equal to the appropriate PCL. If the concentrations in the residual cover are high, dredging activities should continue until the appropriate PCL is achieved. The assumed concentrations of 198 ng/kg and 499 ng/kg for TCDD and TCDF, respectively, would result in a TEQ of 247.9 ng/kg, which is higher than even the proposed PCL of 220 ng/kg and does not include the contribution from the other congeners, therefore these assumptions are incorrect.

References

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Attachments:
Attachment 1 - UH Bioaccumulation Fish and Crab i1552-8618-28-11-2307

Attachment 2 - Sediment and Fish Tissue San Jac River UH Attachment 3 - TCEQ Chapter 307 TSWQS
Attachment 4 - Dioxin Remediation Summary Attachment 5 - Dredging Remediation at other Sites
Attachment 6- Remediation Figures